



# **Armed Forces College of Medicine AFCM**



# Wrist & hand joints

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***Ass. Professor of Anatomy***

## INTENDED LEARNING OBJECTIVES (ILO)



**By the end of this lecture the student will be able to:**

- 1. Describe type, articular surfaces, fibrous capsule, synovial membrane, ligaments, movements, arterial & nerve supply of wrist joint**
- 2. Identify type and movements of small joints of hand.**

# What do you see ?



# *Wrist joint*

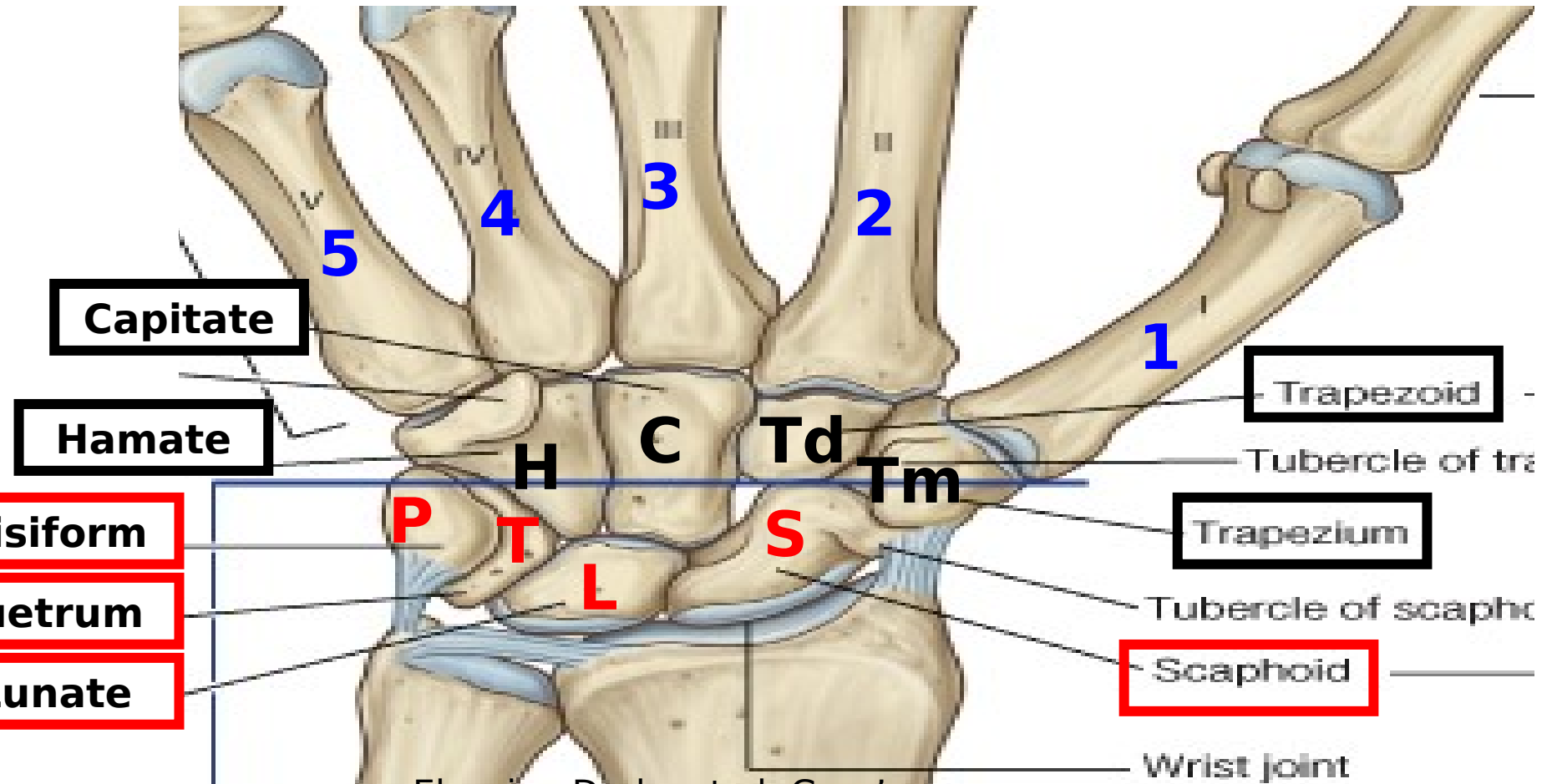
# Carpal & metacarpal bones



▪Carpal bones are arranged in 2 rows:

**Proximal (4) & distal (4).**

▪Metacarpal bones are numbered 1-5 from lat. to med.

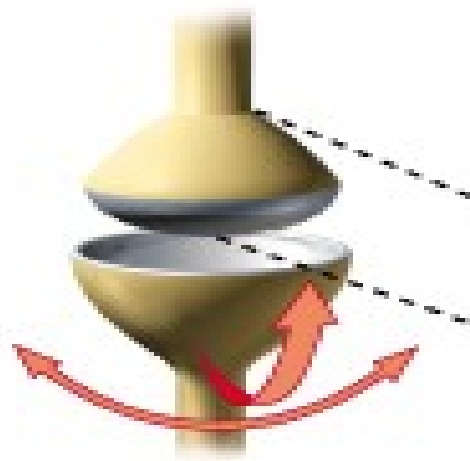


Elsevier. Drake et al: Gray's anatomy for student- [www.studentconsult.com](http://www.studentconsult.com)

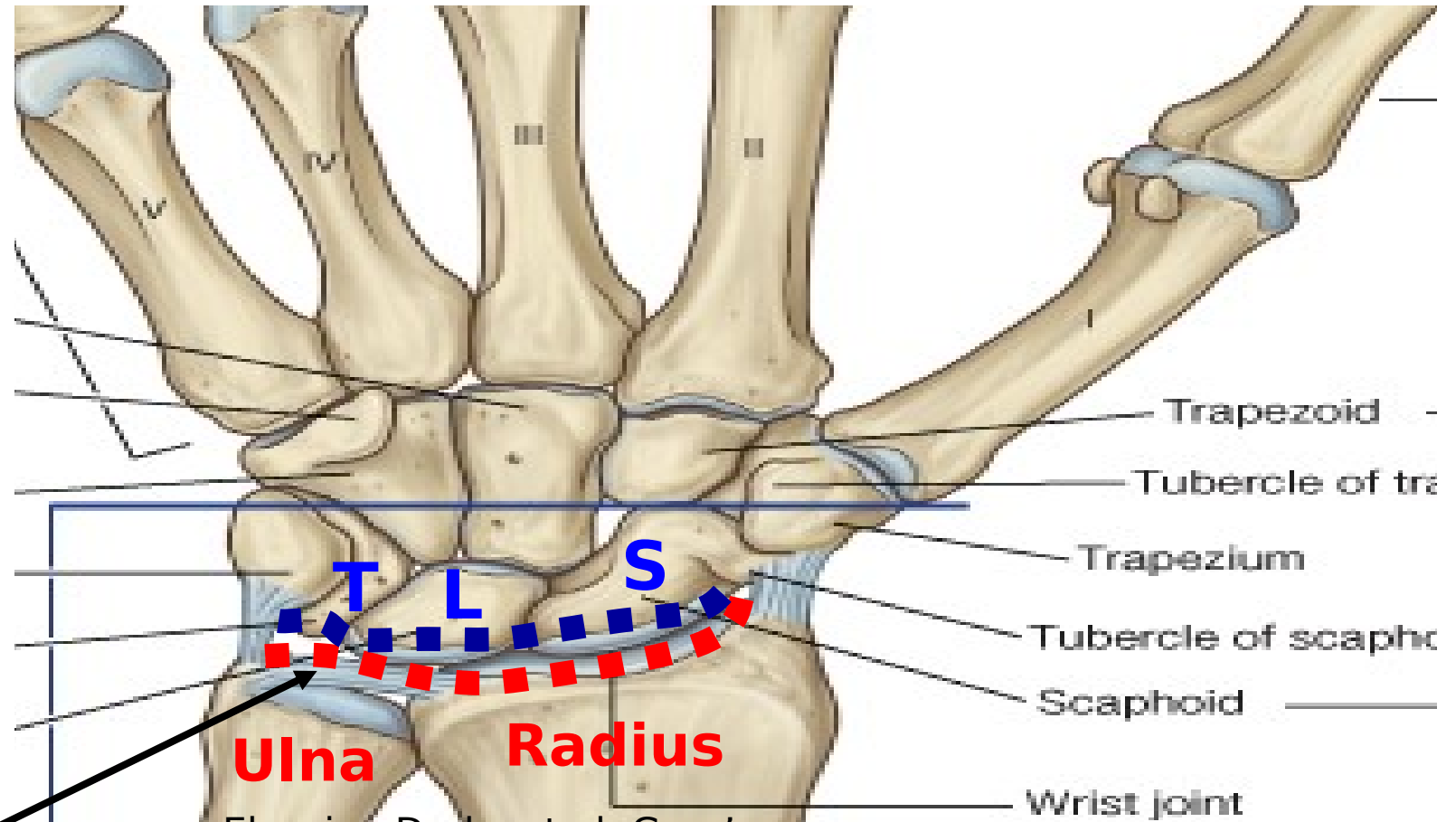
# Articular surfaces of wrist joint



**Type:**  
**Ellipsoid**

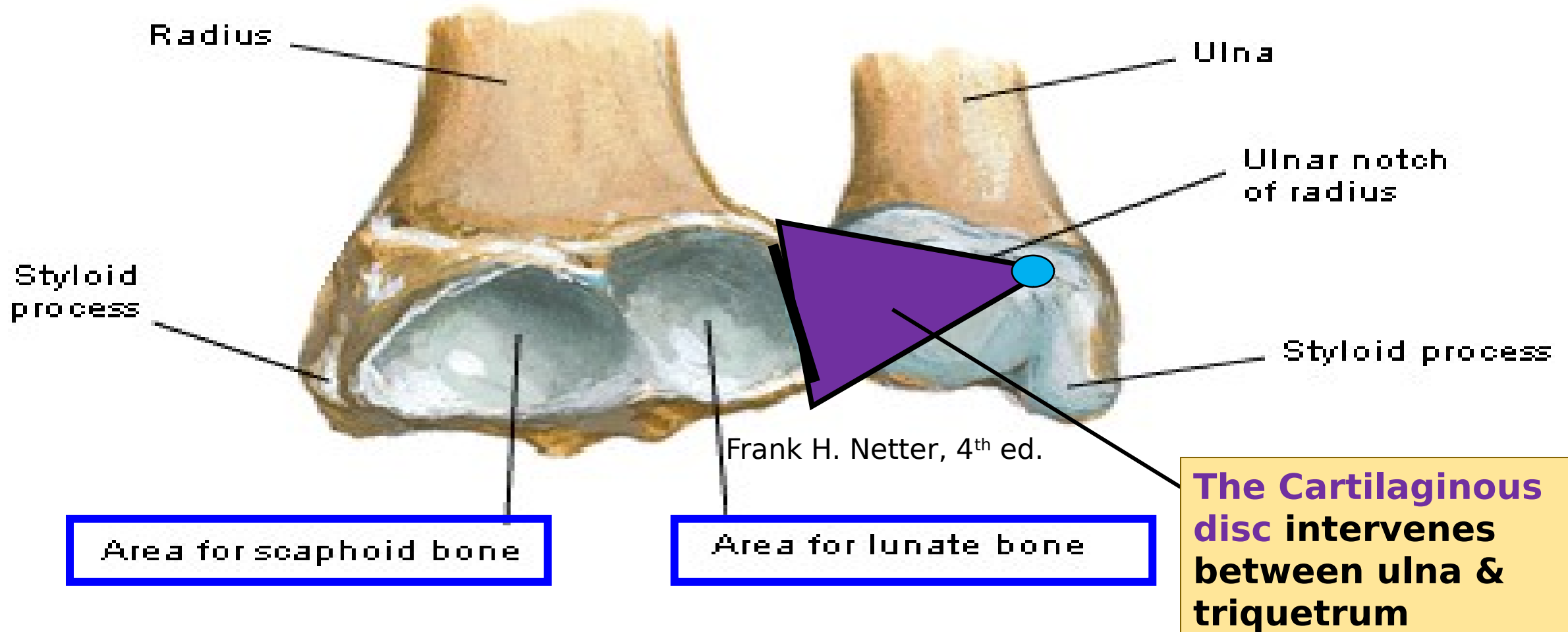


**Articular disc**



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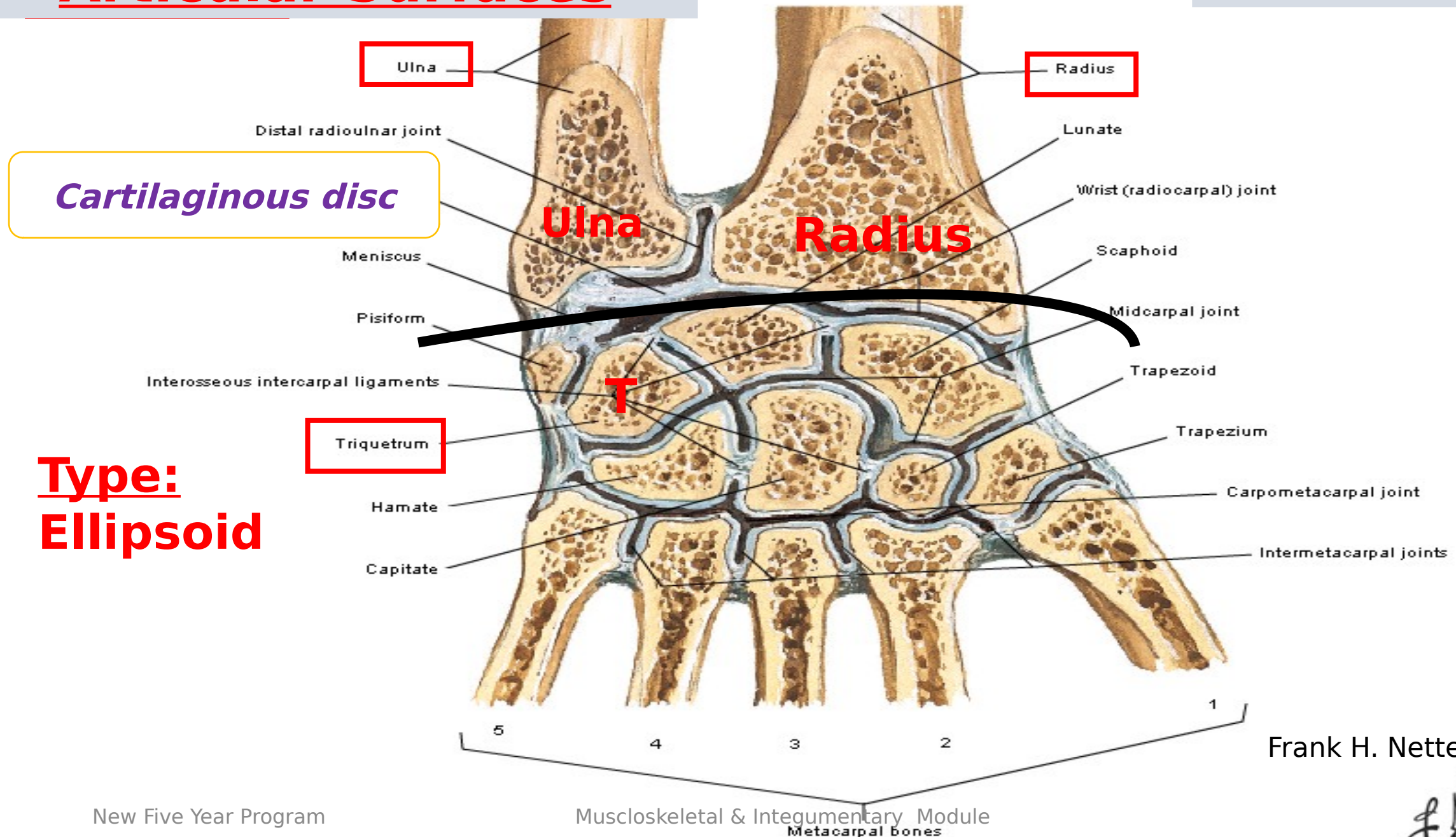
# Articular surfaces & cartilaginous disc of wrist joint



It is attached to inf. surface of ulna (in the groove bet. Head & styloid process) & on the radius (inf. border of ulnar notch)

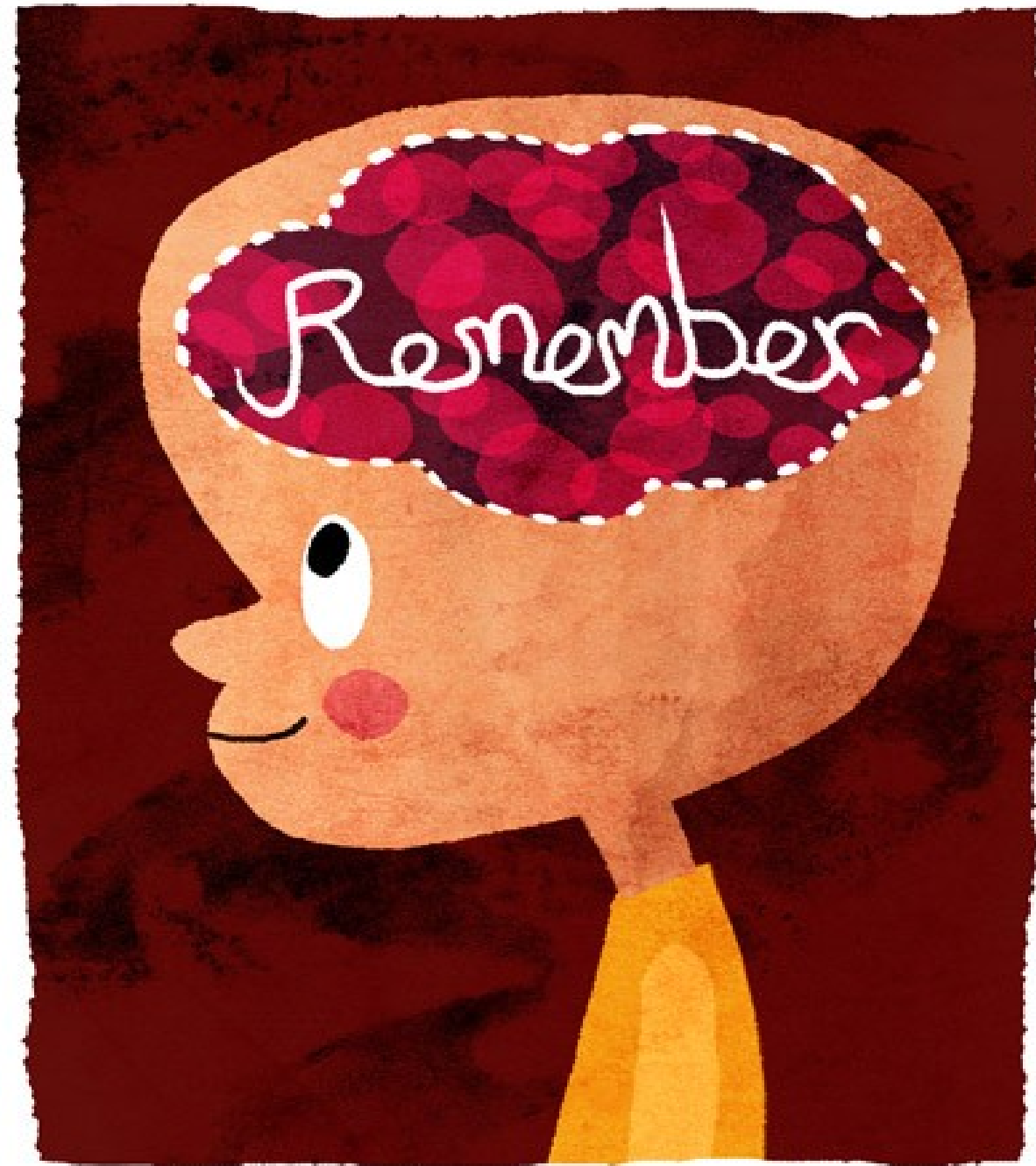
# Articular Surfaces

## Cut Section

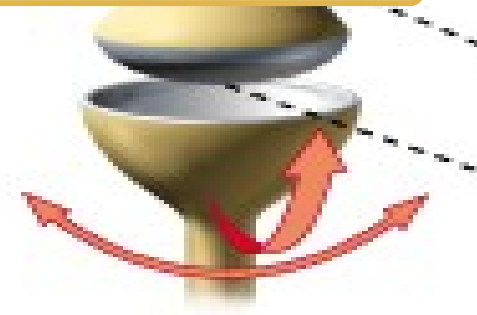


Frank H. Netter, 4<sup>th</sup> ed.

- **Ulna does not share in the wrist joint.** That is why this joint is called the **radiocarpal joint**. Head of ulna is separated from the carpal bones by the triangular articular disc



# Wrist (Radio-carpal) joint



- **Type:** Synovial (Ellipsoid).
- **Articular Surfaces:**
  - 1- **Proximally:** Lower end of radius & cartilaginous disc.
  - 2- **Distally:** Scaphoid, lunate & triquetrum.
- **Capsule:** attached to the margin of the articular surfaces.
- **Synovial membrane:** Lines the inner surface of the capsule.

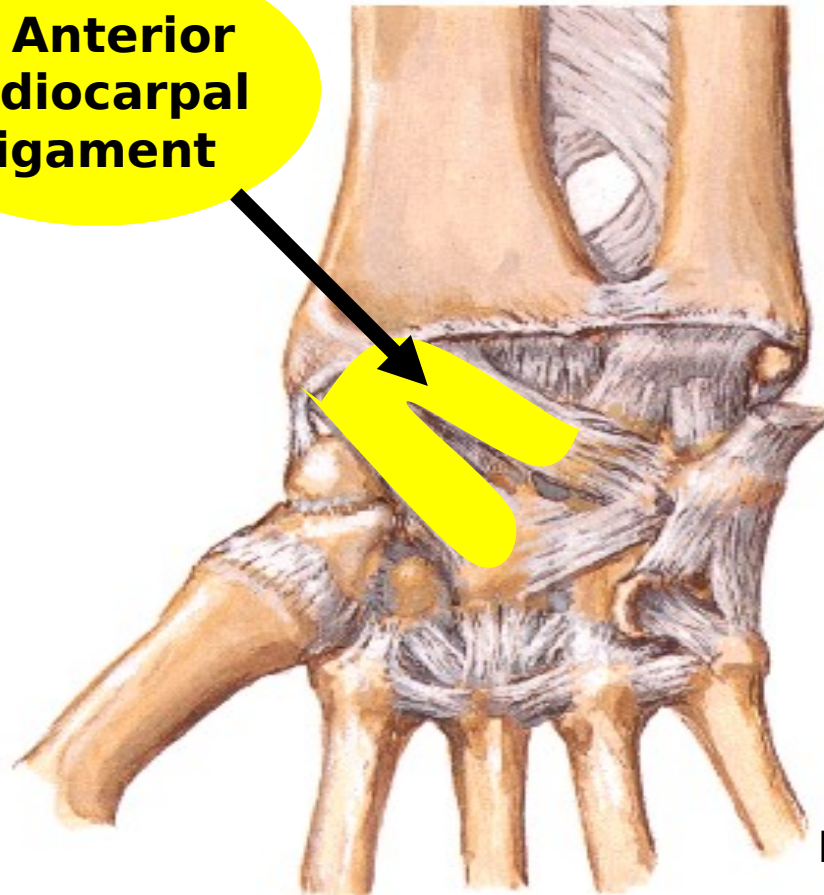
# Ligaments of wrist joint



## Ligaments of Wrist

Flexor Retinaculum Removed - Palmar View

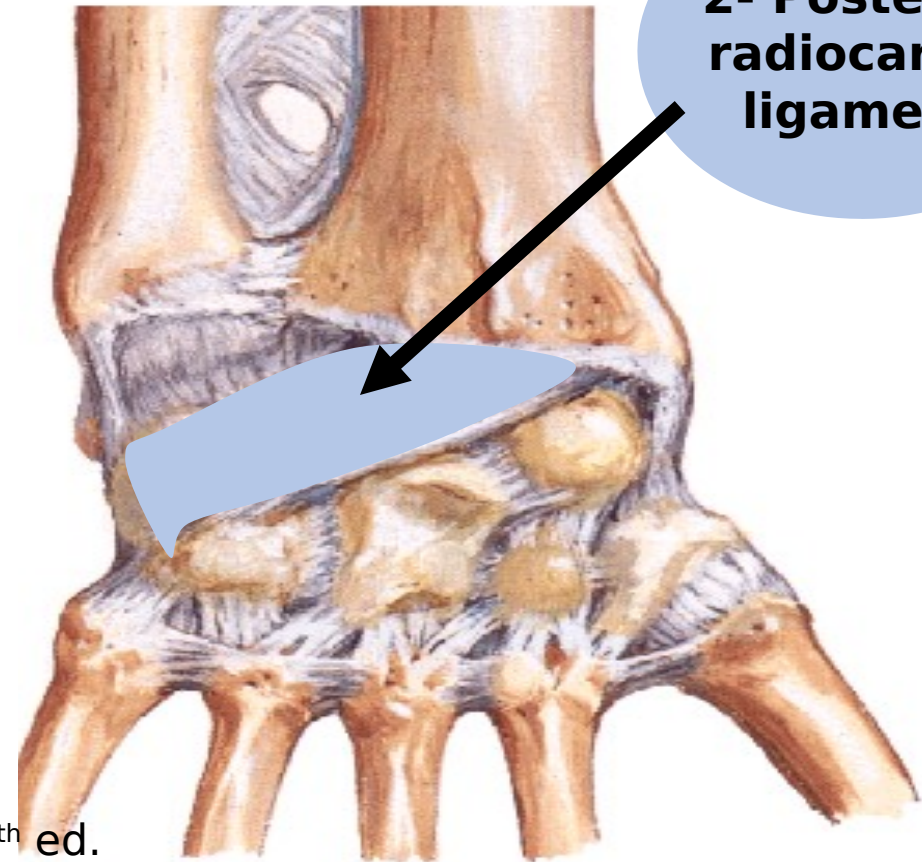
1- Anterior radiocarpal ligament



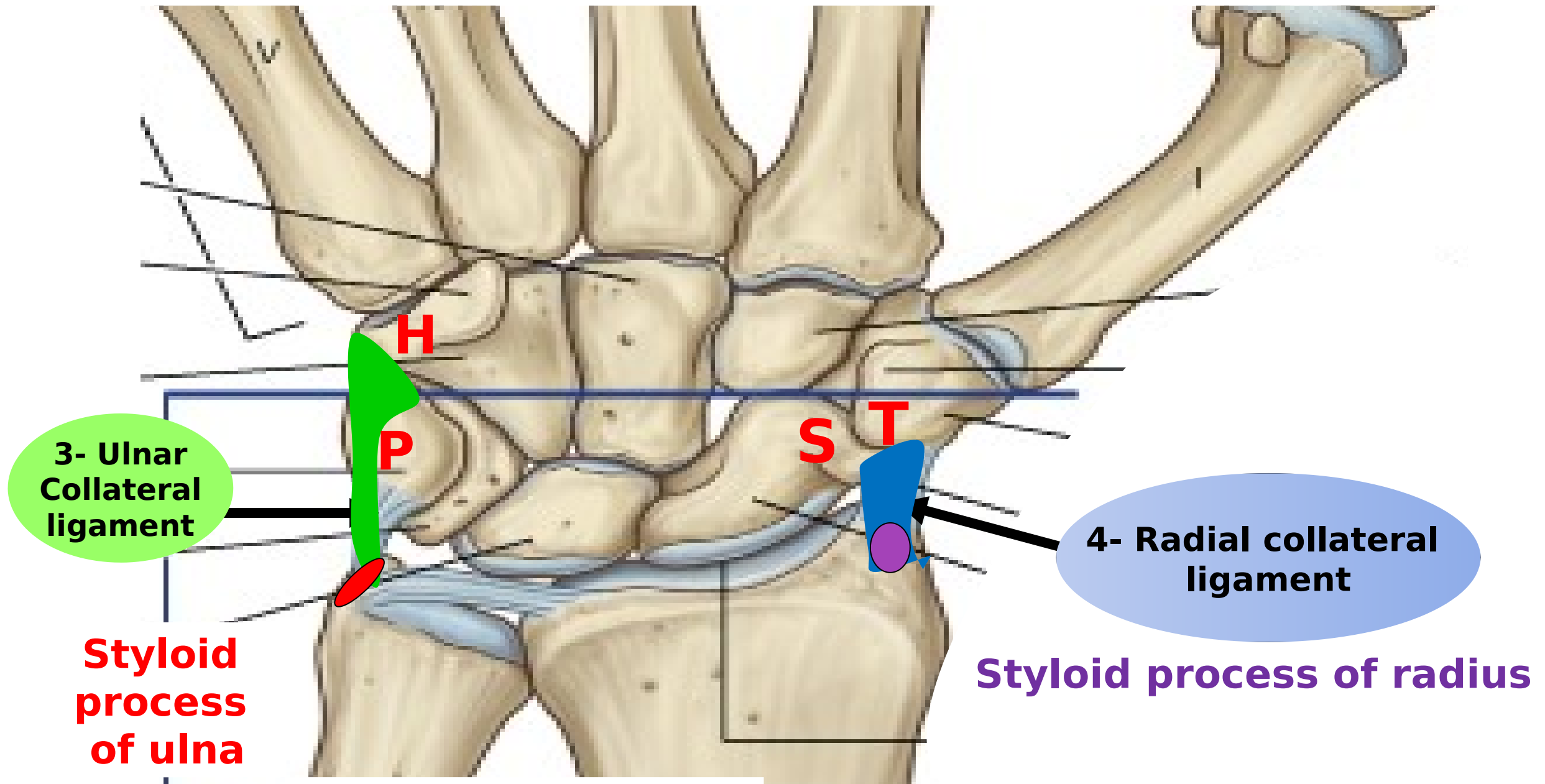
## Ligaments of Wrist

Posterior [Dorsal] View

2- Posterior radiocarpal ligament



Frank H. Netter, 4<sup>th</sup> ed.



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# Ligaments of wrist joint



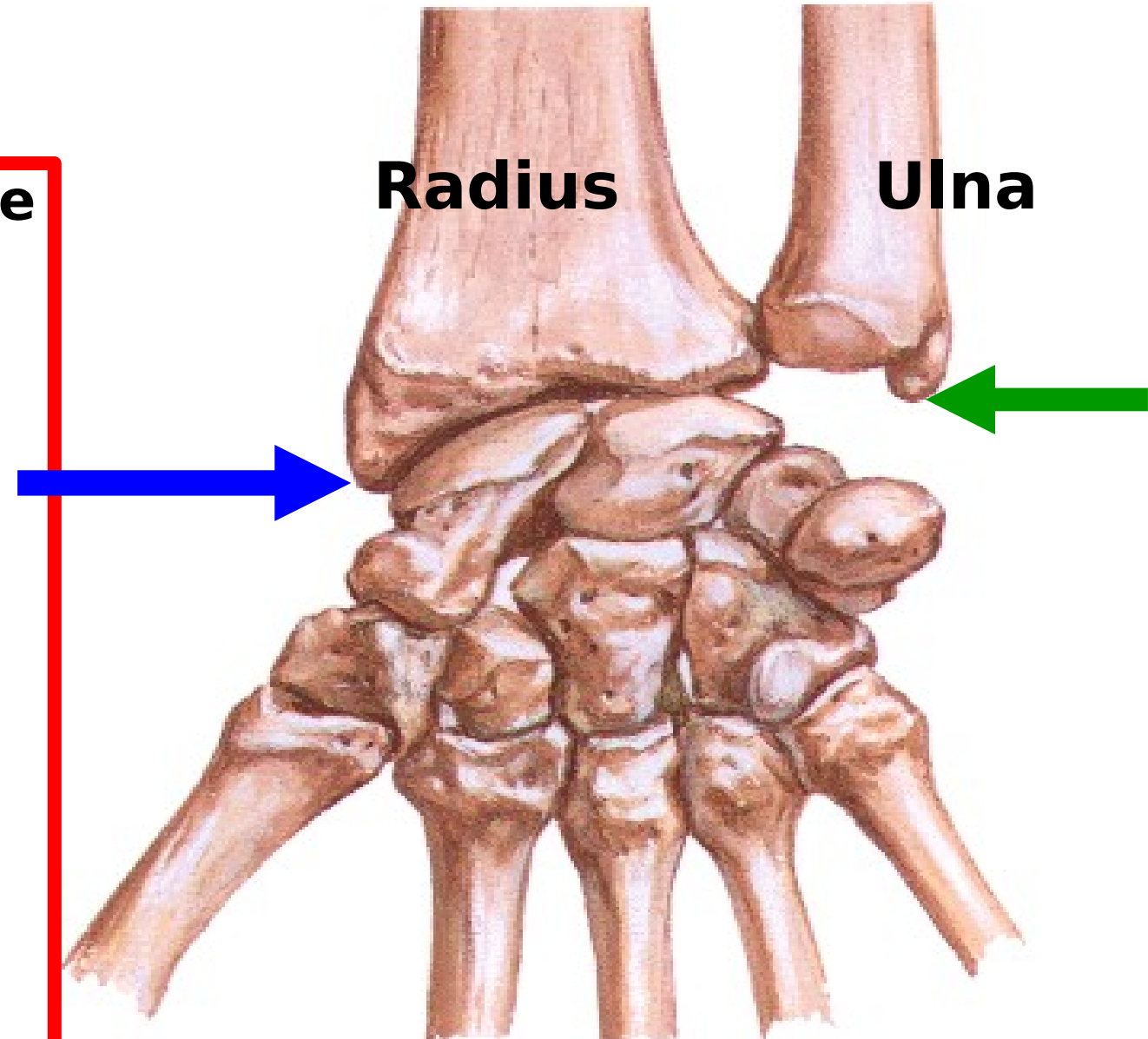
- 1) Ant. radio-carpal lig.** (on the ant. surface of the joint).
- 2) Post. radio-carpal lig.** (on the post. surface of the joint).
- 3) Ulnar collateral lig.** (between styloid process of **ulna** & pisiform + hamate).
- 4) Radial collateral lig.** (between styloid process of **radius** & scaphoid + trapezium).

# Movements of wrist joint



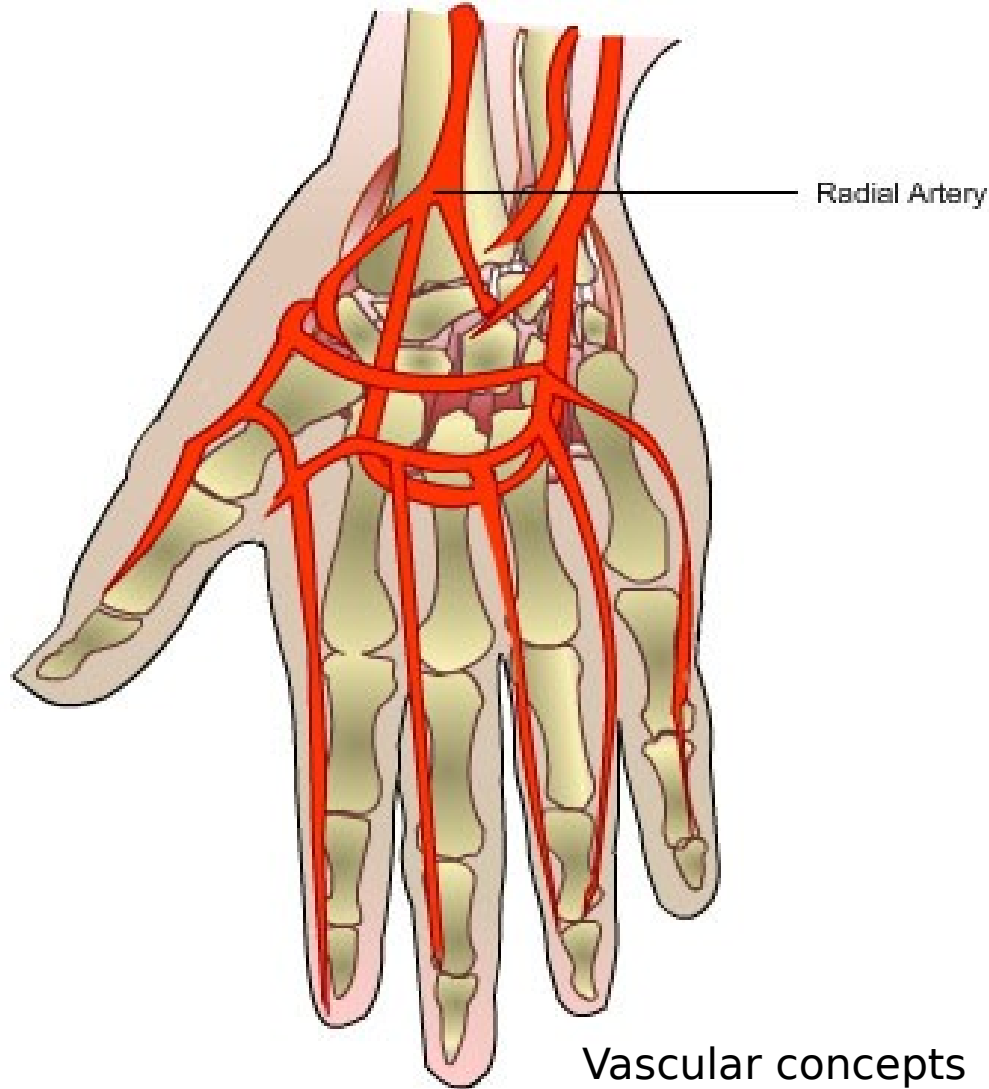
- **Flexion**
- **Extension**
- **Adduction**
- **Abduction**
- **Circumduction**
- **No rotation** (compensated by pronation & supination of forearm)

- Is the range of **adduction** of the hand at the wrist greater or lesser than the range of **abduction** and WHY???
- **ADDUCTION IS GREATER THAN ABDUCTION**
- Because the styloid process of **radius** is lower by 1 cm than the styloid process of **ulna**



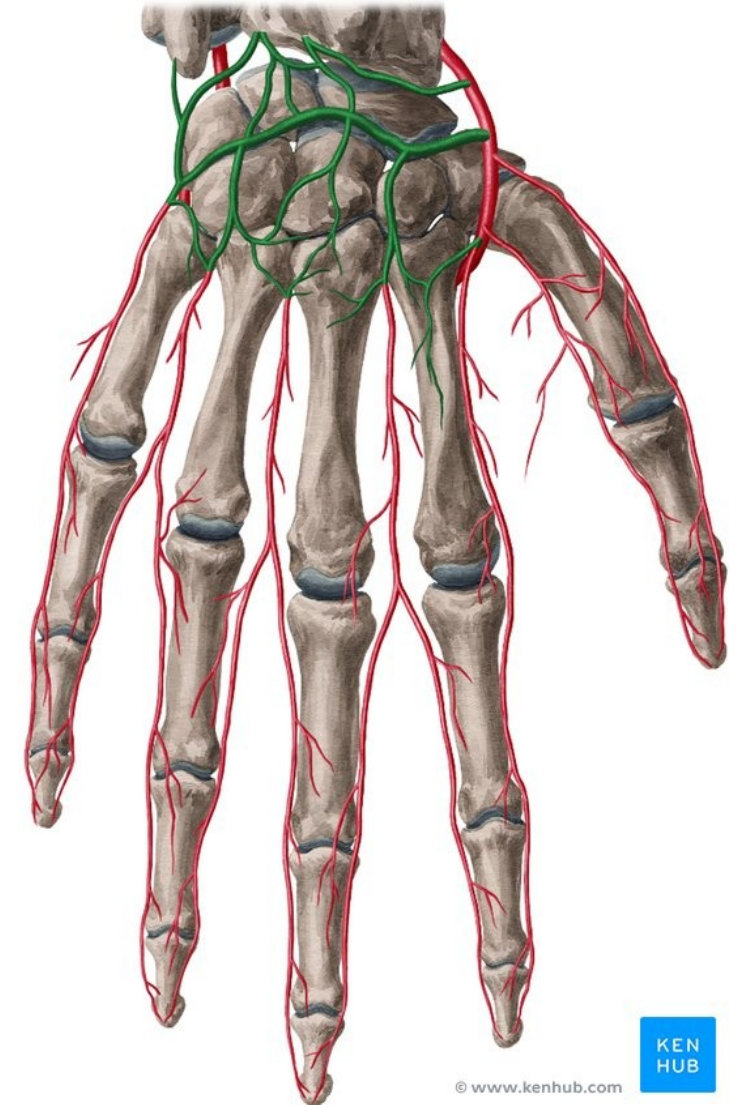
Frank H. Netter, 4<sup>th</sup> ed.

# Arterial supply



Vascular concepts

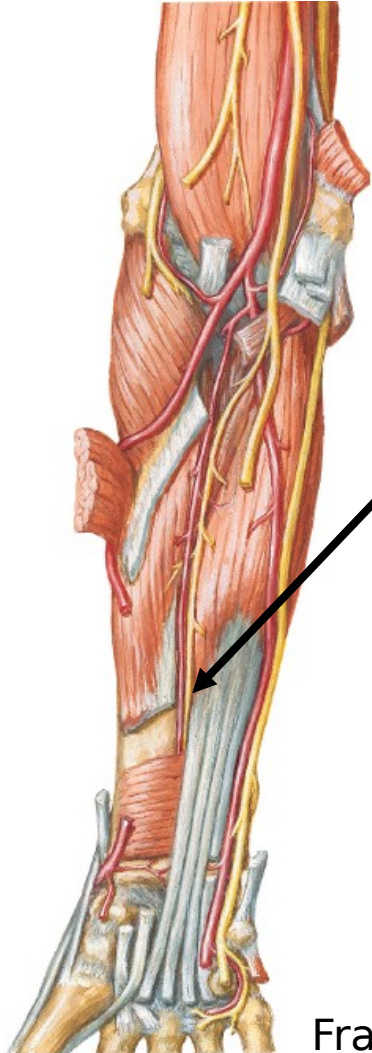
Via  
the **palmar**  
& **dorsal**  
carpal  
arch which  
are derived  
from the  
radial and  
ulnar  
arteries.



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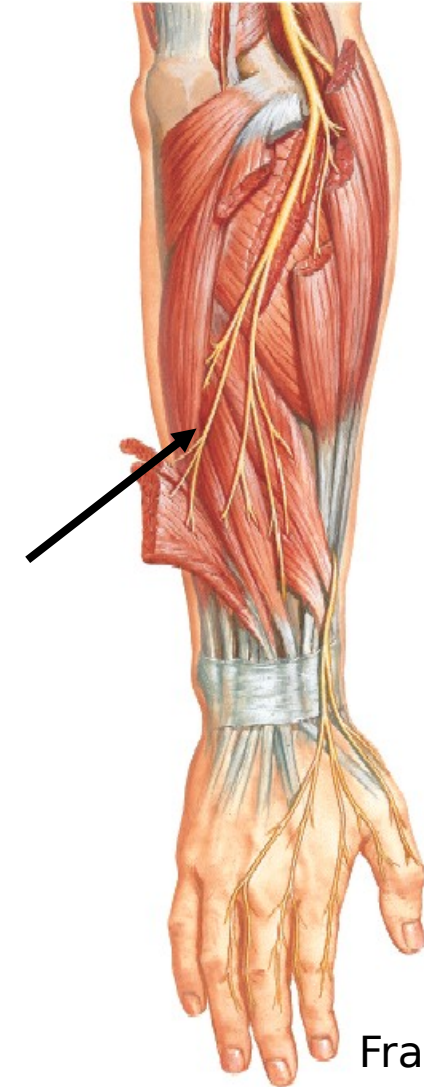


# Nerve supply



- 1)Anterior interosseous nerve.**
- 2)Posterior interosseous nerve.**

Frank H. Netter, 4<sup>th</sup> ed.

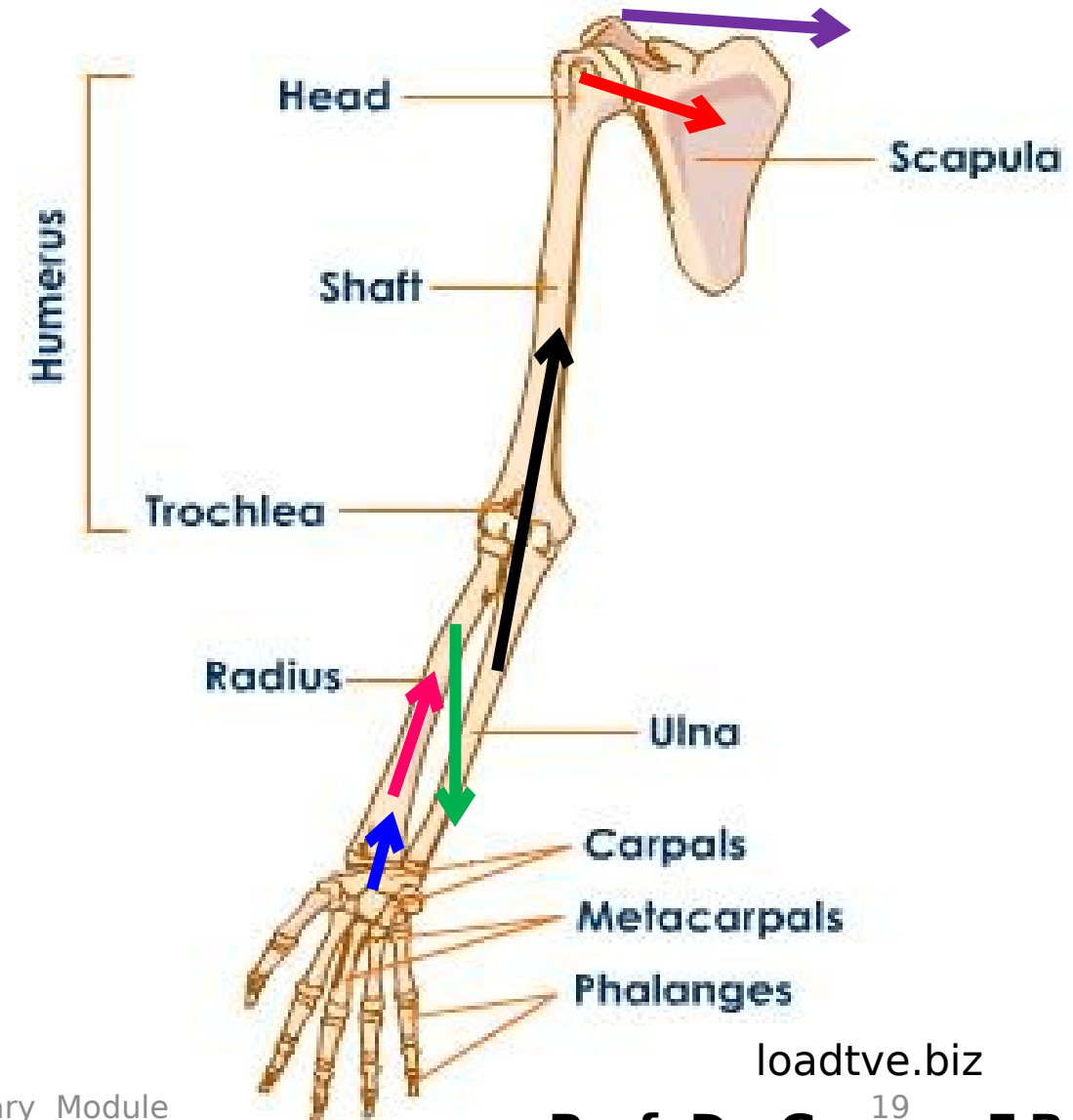


Frank H. Netter, 4<sup>th</sup> ed.

# Clinically important points of wrist joint



- Fall on outstretched hands, forces are transmitted from the **scaphoid** → **distal end of the radius** → **across the interosseous membrane** → **ulna** → **humerus** → **glenoid fossa of the scapula** → **coracoclavicular ligament** → **clavicle** → **sternum**.



# Relax, if you can



# *Joints of Hand*

# All hand joints are plane except 3



## Intercarpal :

**Midcarpal J.:** Plane between proximal & distal rows

## Carpo-metacarpal:

- 1- of the thumb (**saddle**).
- 2- of the rest fingers (**plane**).

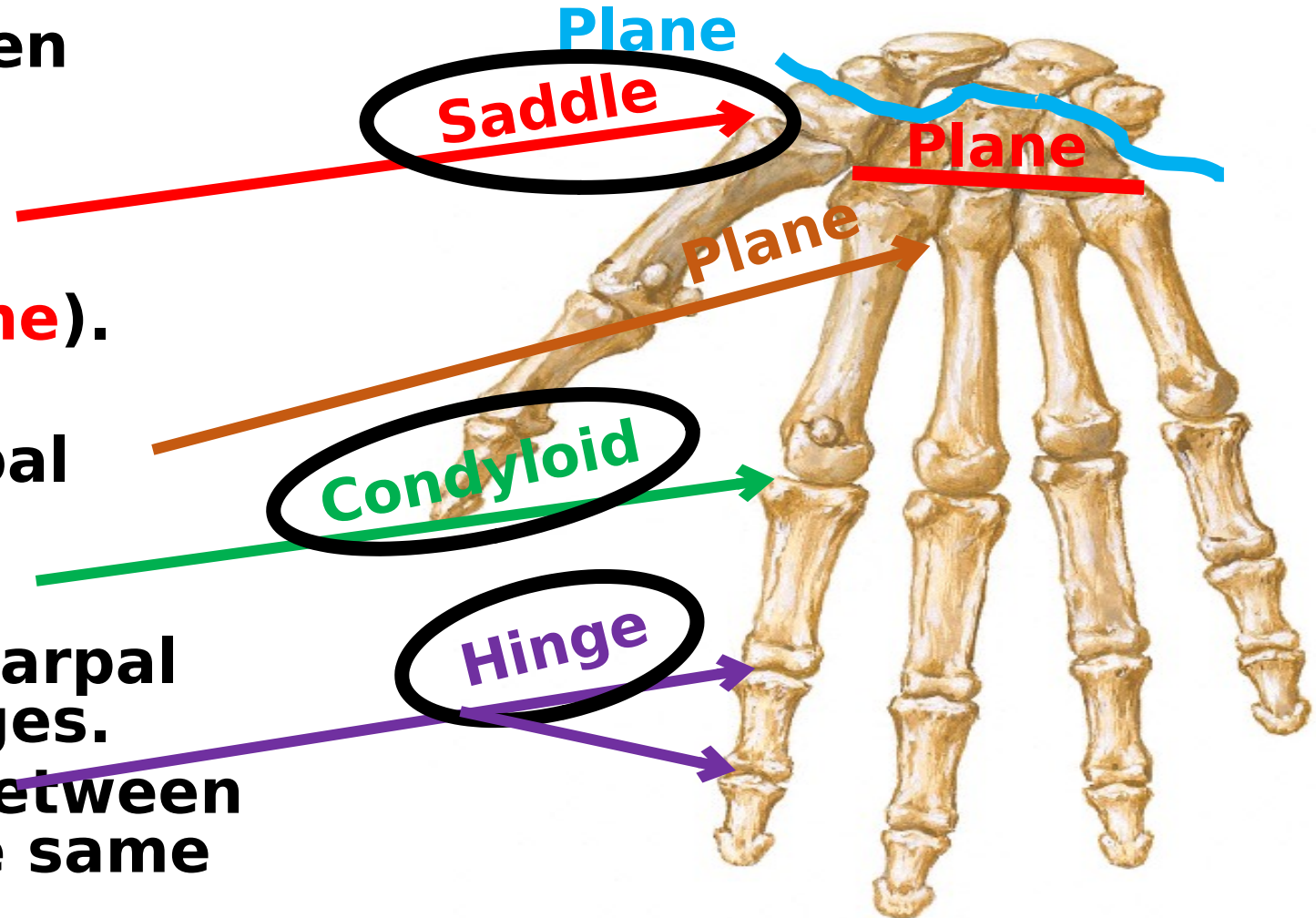
## Inter-metacarpal:

Plane between metacarpal bones No. 2, 3, 4, 5.

## Metacarpo-phalangeal:

Condyloid between metacarpal bones & proximal phalanges.

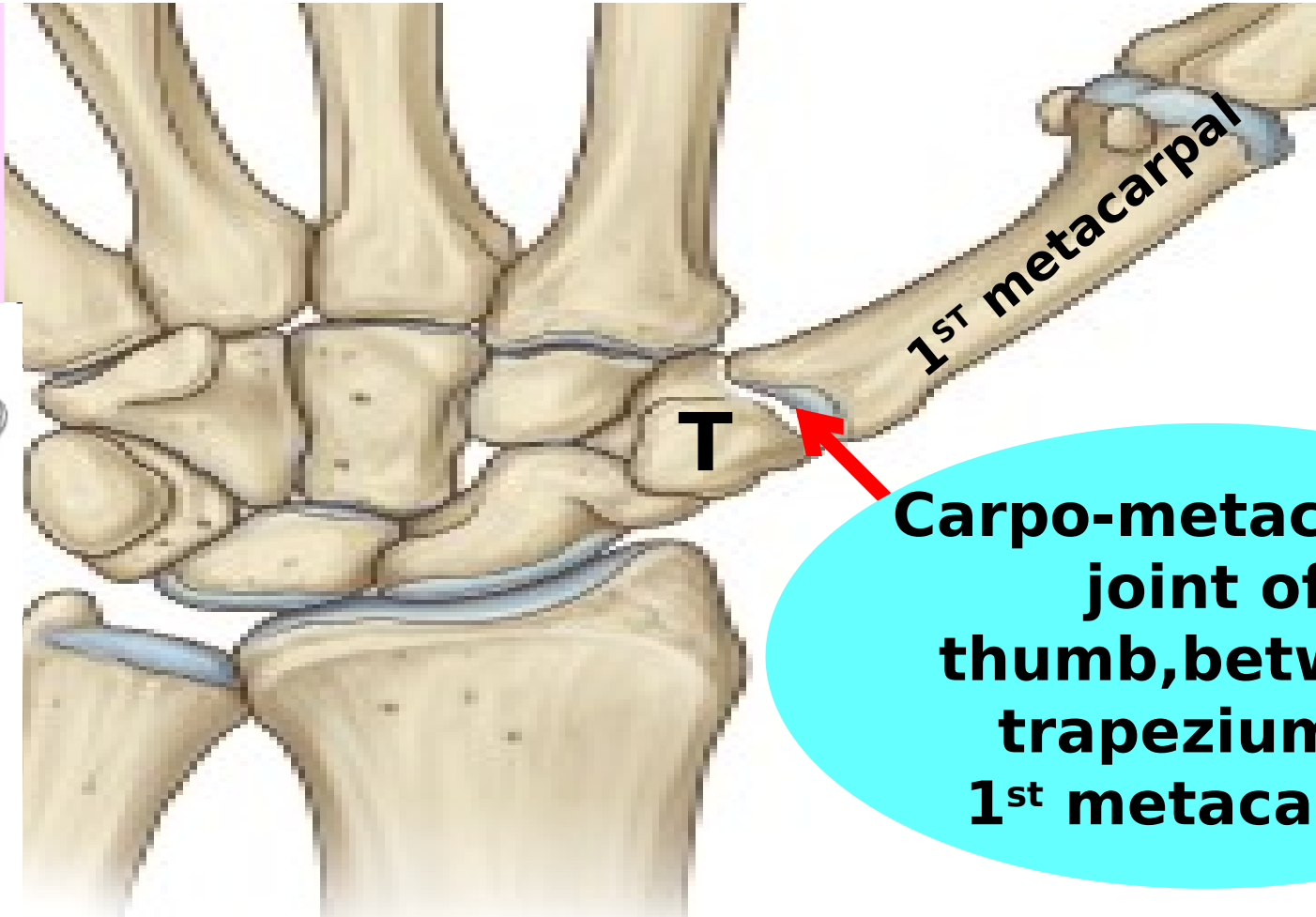
Interphalangeal: Hinge between adjacent phalanges of the same finger.



## SADDLE JOINT



New Five Year Program



**Carpo-metacarpal  
joint of  
thumb, between  
trapezium &  
1<sup>st</sup> metacarpal**

Elsevier. Drake et al: Gray's  
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Musculoskeletal & Integumentary Module

Prof. Dr. George F.B.

**If you have a thumb, you'll  
have a hand**

**SADDLE JOINT**

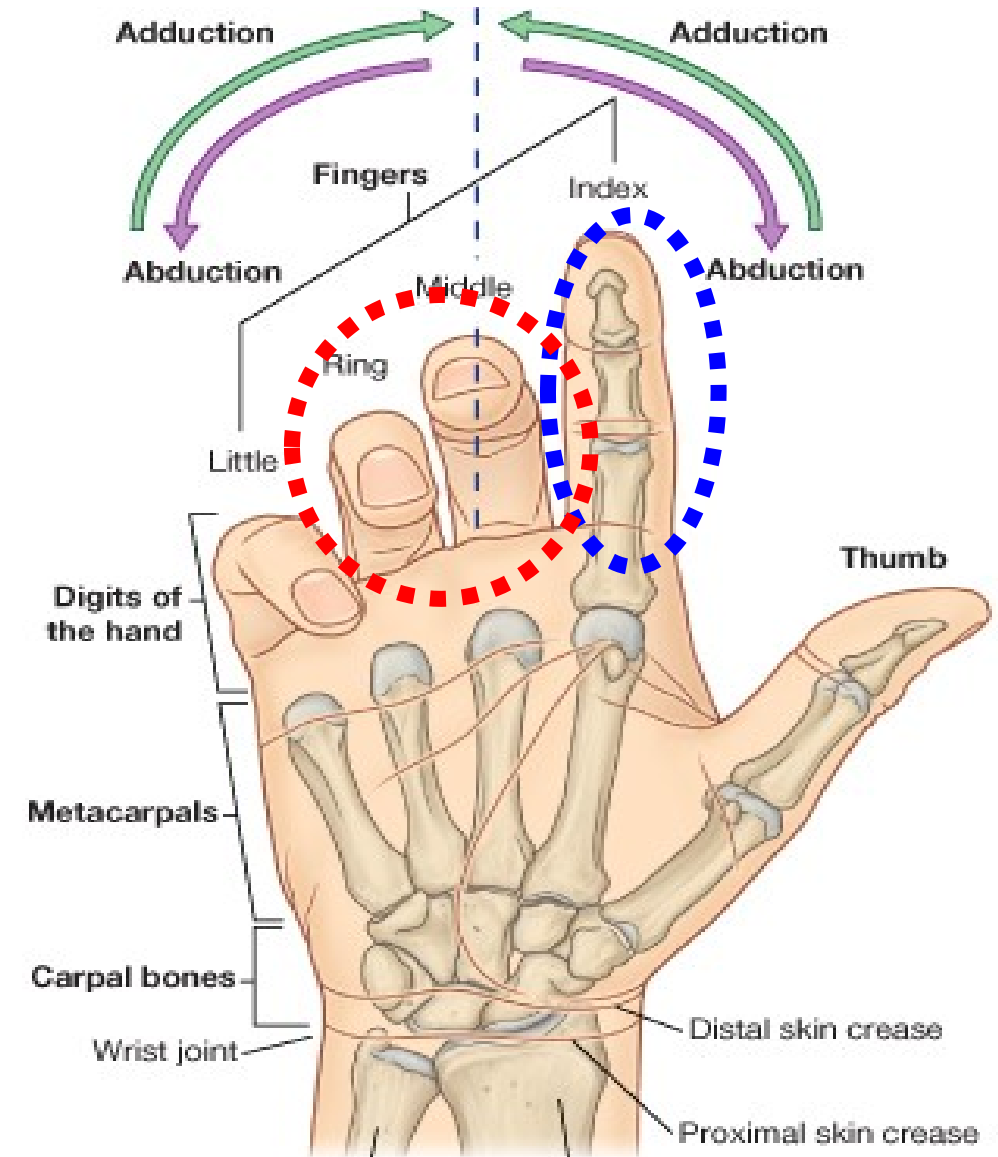
**Carpo-metacarpal  
joint of  
thumb, between  
trapezium &  
1<sup>st</sup> metacarpal**



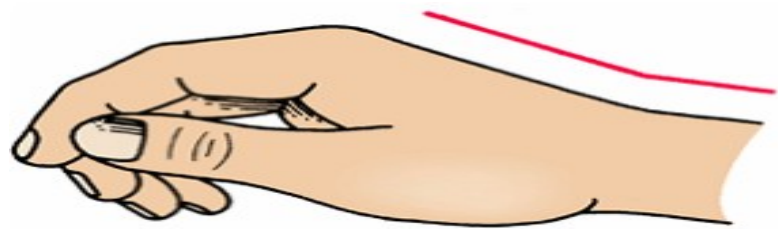
**This medially rotates the thumb 90° in order to  
oppose other fingers**

## • Movements of the med. 4 Fingers:

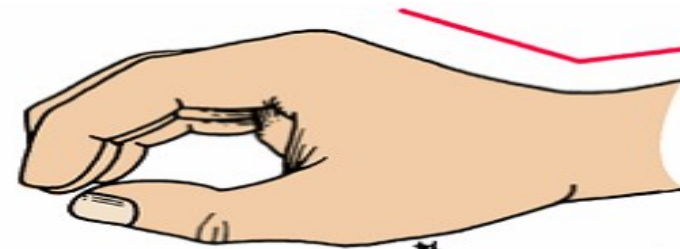
- 1) **Flexion** (fingers **perpendicular** to palm)
- 2) **Extension** (fingers in **same plane** with palm)
- 3) **Adduction** (**towards** middle finger)
- 4) **Abduction** (**away** from middle finger)



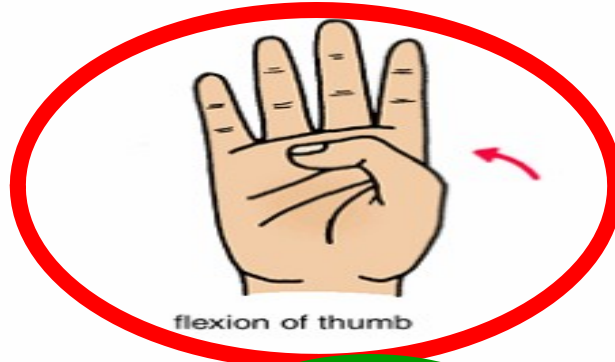
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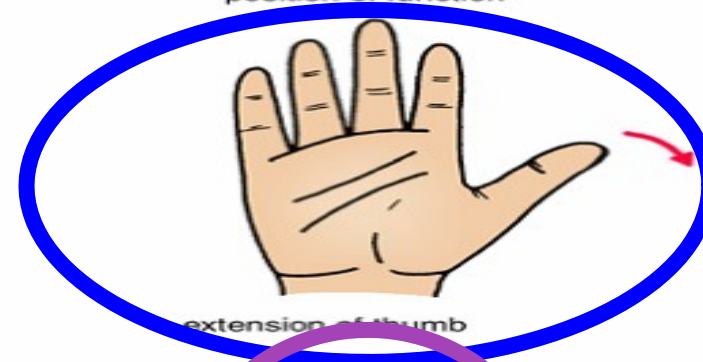
position of rest



position of function



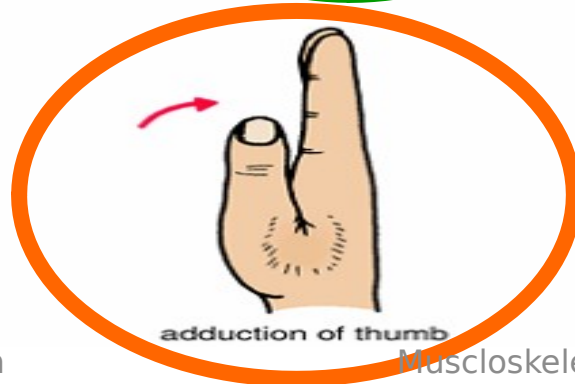
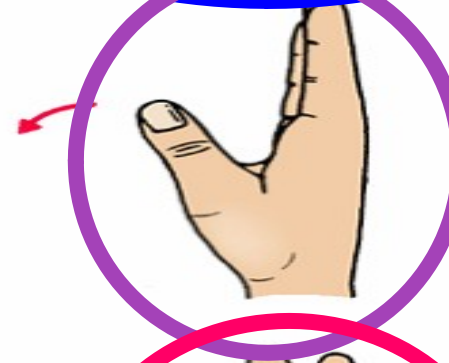
flexion of thumb



extension of thumb



abduction of thumb



adduction of thumb



opposition of thumb

**Ms.  
performing  
these  
actions are  
named  
according  
to their  
function  
e.g.  
adductor  
pollucis.**

Snell's clinical  
anatomy

by region, or 26  
**Prof. Dr. George F.B.**

Flexion of metacarpo-phalangeal joint

Extension of Interphalangeal joints

- **Lumbricals & interossei**, put the fingers in **the writing position** (flexion of metacarpo-phalangeal joints & extension of interphalangeal joints)

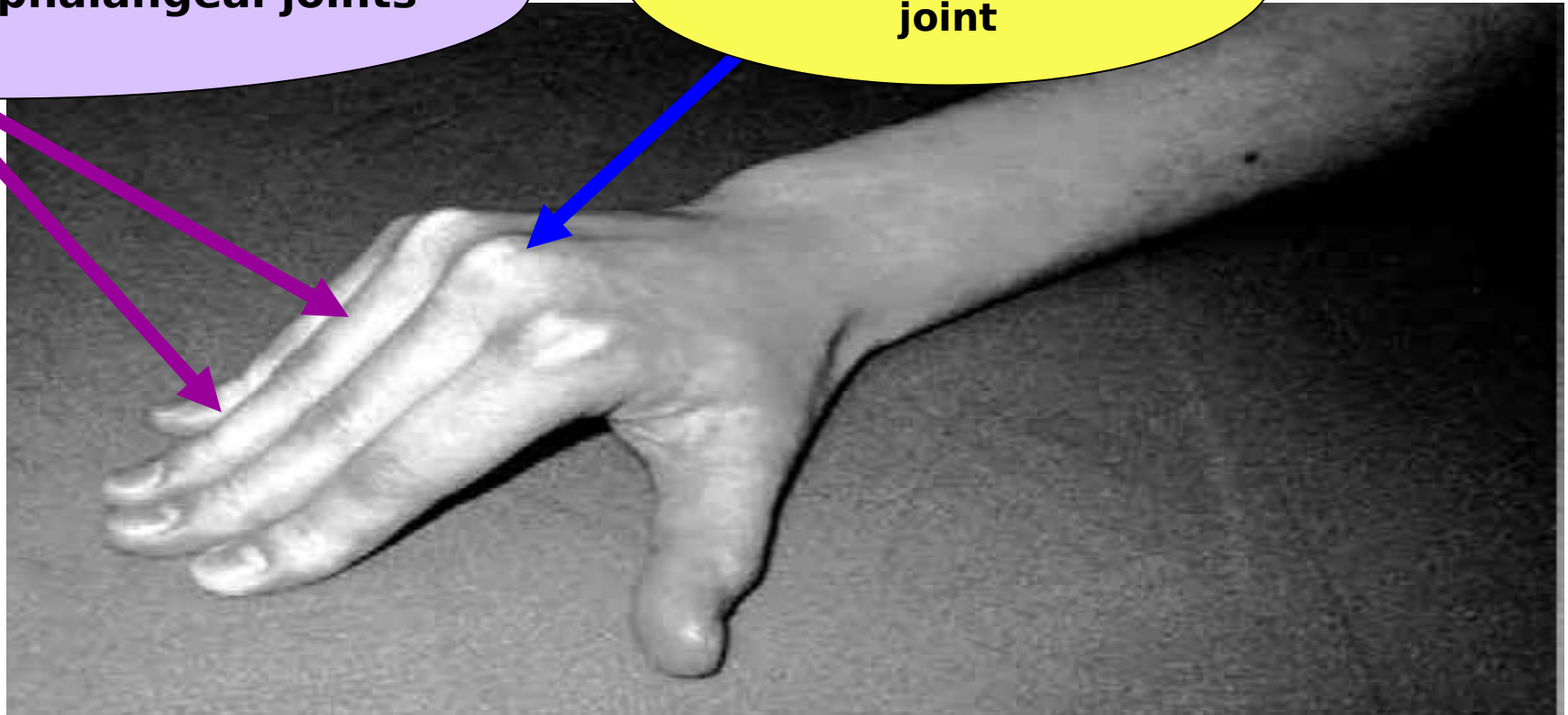


# The writing position



**extension of interphalangeal joints**

**flexion of  
metacarpophalangeal  
joint**



# Try to imagine what happens if lumbricals & interossei are paralyzed



## Writing position

**Flexion of metacarpophalangeal joints**

**Extension of interphalangeal joints**

New Five Year Program



## Claw hand (ulnar N. injury)

**Extension of metacarpophalangeal joints**

**Flexion of interphalangeal joints**

Musculoskeletal & Integumentary Module

Prof. Dr. George F.B.



**During a street fight, a 15-years-old male teen sustained a cut wound that injured his left ulnar nerve. As a result, he developed paralysis of his lumbricals & interossei muscles. Which of the following movements would be affected in the patient?**

- A. Flexion of the carpo-metacarpal joints.**
- B. Extension of the carpo-metacarpal joints.**
- C. Flexion of the metacarpo-phalangeal joints.**
- D. Extension of the metacarpo-phalangeal joints.**
- E. Flexion of the proximal interphalangeal joints.**



**During a street fight, a 15-years-old male teen sustained a cut wound that injured his left ulnar nerve. As a result, he developed paralysis of his lumbricals & interossei muscles. Which of the following movements would be affected in the patient?**

- A. Flexion of the carpo-metacarpal joints.**
- B. Extension of the carpo-metacarpal joints.**
- C. Flexion of the metacarpo-phalangeal joints.**
- D. Extension of the metacarpo-phalangeal joints.**

## SUGGESTED TEXTBOOKS



Snell Clinical Anatomy by regions 9<sup>th</sup> edition, p. 411- 414 & figures 9.77, 9.78 in page 414.



# The End